

REMARKS

Claims 1-57 were pending in the present application. As a result of the prior restriction requirement, claims 24-33 and 54-57 were withdrawn, without prejudice, leaving claims 1-23 and 34-53 for prosecution in this application. New claim 58 has been added.

The undersigned attorney appreciates the patent number correction made by the Examiner in the disclosure statement filed on September 7, 2004..

Specification

The specification has been amended (specifically, Paragraph [0034]) in accordance with the Examiner's suggestion.

Drawings

The drawings have been objected to as being informal, with handwritten notations thereon.

Red-lined drawings are attached hereto, as shown:

FIG. 3A (sheet 3/13) more accurately illustrates the polarizing element 341;

FIG. 3B (sheet 4/13) more closely places element number 352 to S-pol;

FIGs. 6C and 6D (sheet 7/13) add the element numbers 604 and their respective lead lines;

FIG. 8 (sheet 8/13) shows an element 340 that is shown faintly in the original drawings as filed.

FIG. 12C (sheet 13/13) deletes the extraneous word "is" in the text as shown.

A full set of formal replacement drawings (11 sheets in total), marked appropriately, accompany this response, making any further objections to the drawings moot.

Claim Objections

Claims 7, 37, 40 and 45 are objected to because of certain informalities. Claims 7, 37 and 45 have now been corrected as suggested by the examiner. Claim 40 has been amended to ensure that proper antecedent basis is provided for the terms objected to.

Prior Art Rejections

Claims 1-3 and 5-9 are rejected under 35 U.S.C. 102(b) as being unpatentable over U.S. Patent 4,340,304 to Massie. The rejection is respectfully traversed as applied to the rejected claims as amended.

As amended, claim 1 now requires that the comparison image not be obtained from the portion of the sample, from which the interference pattern is obtained, for comparison with the comparison image. This clearly differentiates from Massie.

Massie describes an interference technique for detecting defects in a sample mirror surface 40. An illumination beam is divided into a sampling beam and a reference beam. The reference beam is reflected from a flat reference mirror surface 35. The sampling beam is reflected from the sample mirror surface 40. The reflected sampling beam and reflected reference beams interfere at a detection cell or array 46. Each detector detects the interference pattern from a corresponding location of the sample mirror surface 40. A phase shift is introduced into the reference beam by shifter 37. During a cycle of the data acquisition process, after an interference pattern is detected by array 46, voltage applied to the phase shifter 37 is increased by a step to increase the phase shift by a few degrees, and the output value of each detector in the array is compared to the previously stored highest output value at a corresponding memory storage location. This value replaces the stored value at the corresponding memory storage location if it is greater than the stored value and is discarded if this is not the case. Also stored together with the output value at the corresponding memory storage location is the corresponding current phase value of the shifter 37. The maximum detector output marks the running of a fringe line over the sample mirror. This process is repeated until the end of the cycle. The stored phase values corresponding to the sample mirror surface locations of the detectors in the array 46 then are directly proportional to the desired optical path differences (OPD) at these locations, and therefore yield information on the local unevenness of the sample mirror. As noted by Massie, the OPD information is contained exclusively in the stored phase values, and not in the detector output values, and that absolute values of intensity are meaningless. See columns 6 and 7 of Massie.

From the above, it is clear that the reason for comparing the detected interference fringe intensities by the detectors in the array 46 is only for identifying the phase values of the reference beam which marks the running of a fringe line over the sample mirror at the location

detected by the detector. As noted above, the intensity values themselves are meaningless. Thus, Massie's technique relies on the process for finding the phase value that identifies the running of the fringe line over a location on the sample mirror, which is obtained by comparing the detector output value of the interference pattern generated from such location to the previously stored highest output value for the same location to find the phase value that corresponds to the maximum detector output. If the detector output value of the interference pattern generated from such location is instead compared to the previously stored highest output value for a different location, then the corresponding phase value becomes meaningless, and Massie's technique fails.

It is believed to be well settled that, in order for a reference to anticipate a claim, there must be identity of elements between those of the reference and those of the claim. Hence, Massie clearly fails to anticipate claim 1, since it fails to teach the feature of comparing the interference pattern with a comparison image that is not obtained from the portion of the sample from which the interference pattern is generated.

Furthermore, from the above, it is evident that Massie does not suggest the above feature of claim 1 either. If anything, Massie actually teaches away from such feature, since Massie's technique requires that the intensity of the interference pattern at a location of the sample mirror be compared to a previously stored value obtained from the same location of the mirror. Otherwise, Massie's technique fails as explained above. Hence, it is believed that claim 1 is nonobvious over Massie. Claim 1 is thus believed to be allowable.

Claims 2, 3, 5-9 are believed to be allowable since they depend from claim 1.

Claims 45-48 are rejected under 35 U.S.C. 102(b) as being unpatentable over U.S Patent 5,999,261 to Pressesky. The rejection is respectfully traversed as applied to the rejected claims as amended.

Pressesky relates to an interferometer for reconstructing motion of a target. An illumination beam is divided into a measurement beam and a reference beam. The reference beam is further split into two sub-reference beams 90 degrees apart in phase. The measurement beam is reflected from a moving target and split into two sub-measurement beams. One of the sub-reference beams and one of the sub-measurement beams interfere to form an interference pattern, and the other one of the sub-reference beams and the other one of the sub-measurement beams also interfere to form another interference pattern. The in-phase and out-of-phase signals

are detected for reconstructing the motion of the target. Pressesky, however, fails to teach or suggest the following feature of claim 45: comparing at least one of the first and second interference patterns with a comparison image that is not obtained from the portion of the sample to determine features of the sample. Hence Pressesky fails to anticipate claim 45 since there is no identity of elements between Pressesky and those of the claim 45.

Since Pressesky is interested only in the reconstruction of the motion of a target, there is no reason or motivation for one skilled in the art to compare the interference patterns formed with any comparison image, since this will not enhance the reconstruction of the motion of a target. Hence it is believed that claim 45 is nonobvious over Pressesky as well. Claim 45 is thus believed to be allowable.

Claims 46-48 are believed to be allowable since they depend from claim 45.

Claims 4, 12, 13, 17, 18, 20 and 34-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Massie. The rejection is respectfully traversed as applied to the rejected claims as amended.

Claim 4 is believed to be allowable since it depends from claim 1.

For substantially the same reasons as those explained above for claim 1, claim 12 is believed to be patentable over Massie. Claim 12 further distinguish over Massie in that it contains “adjusting a phase of the illumination first reference beam to adjust contrast between a first portion of the first interference pattern and a second portion of the first interference pattern.” As explained above, in order for Massie’s technique to operate, the detector output from a location on the sample mirror must be compared to a prior detector output from the same location on the sample mirror. This is not contrast between two different portions of an interference pattern as required in claim 12. In fact, this is contrary to the ordinary meaning of the word “contrast” which in optical imaging implies a comparison between two different areas, and not different values obtained from the same area as required in Massie. We therefore disagree with the opinion of the Examiner as stated on page 8 of the Office Action.

Regarding claim 17, Massie clearly fails to teach the use of a second reference beam when a first reference beam is also used.

As for claim 18, Massie clearly fails to teach the use of a second reference beam and the use of a second detector to detect a second interference pattern when a first reference beam is also used.

In addition, in claim 20, since Massie clearly fails to teach the use of a second reference beam when a first reference beam is also used, it clearly fails to disclose any relative phase between the two reference beams.

For substantially the same reasons as those explained above for claim 12, claim 34 is believed to be patentable over Massie.

Claims 35-39 are believed to be allowable since they depend from claim 34.

The undersigned attorney appreciates the Examiner's indication that claims 10, 11, 14-16, 19, 21-23 40-44 and 49-53 would be allowable if rewritten in independent form. This has not been done since the claims upon which they depend are also believed to be allowable.

CONCLUSION

In view of the amendments and remarks contained herein, it is believed that all pending claims 1-23, 34-53 and 58 are in condition for allowance and an indication of their allowance is requested. However, if the Examiner is aware of any additional matters that should be discussed, a call to the undersigned attorney at: (415) 318-1162 would be appreciated.

Respectfully submitted,



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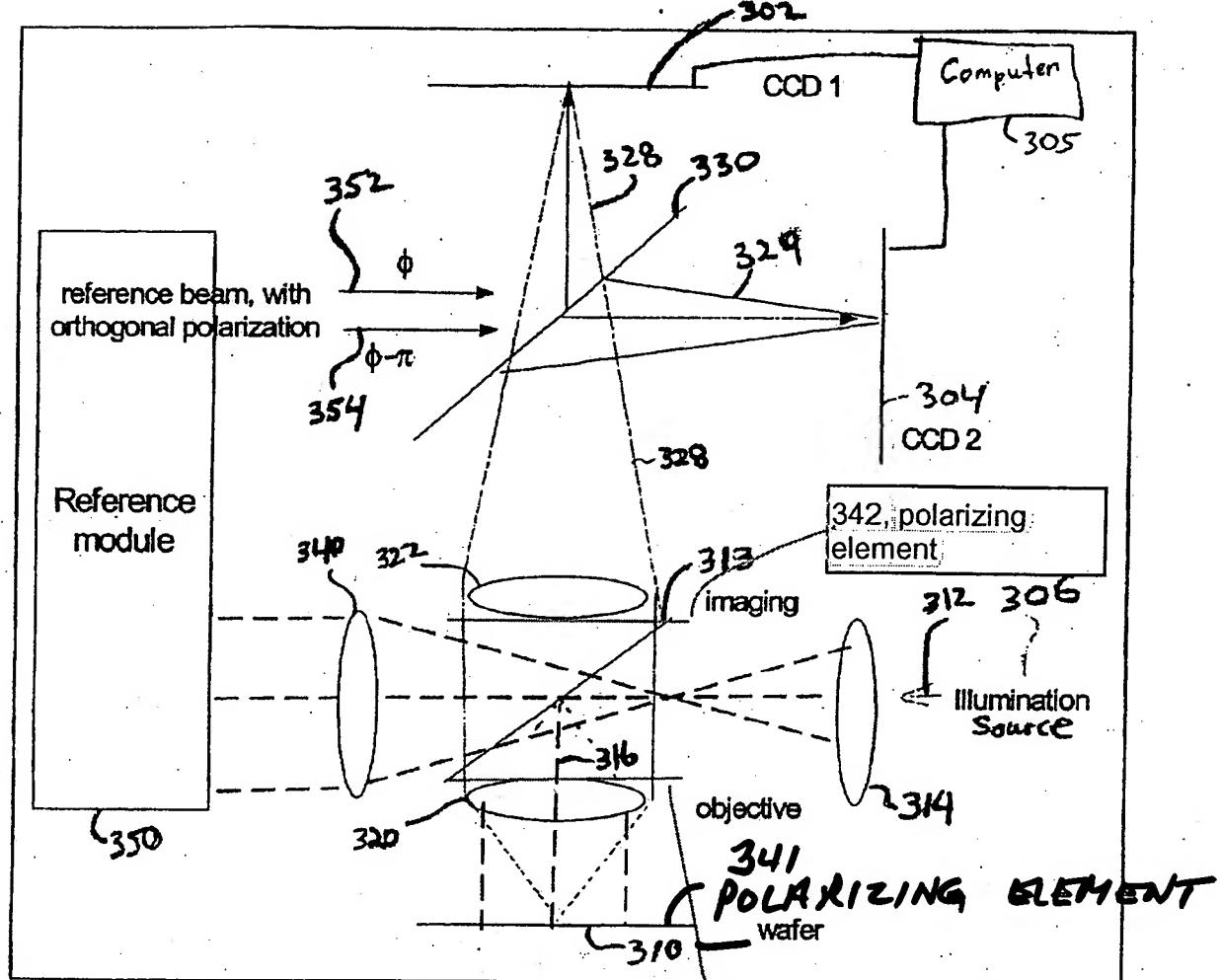
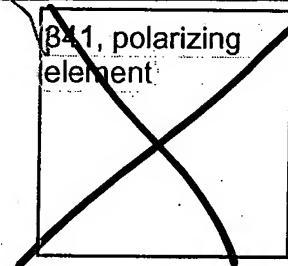


FIG. 3A



Reference module

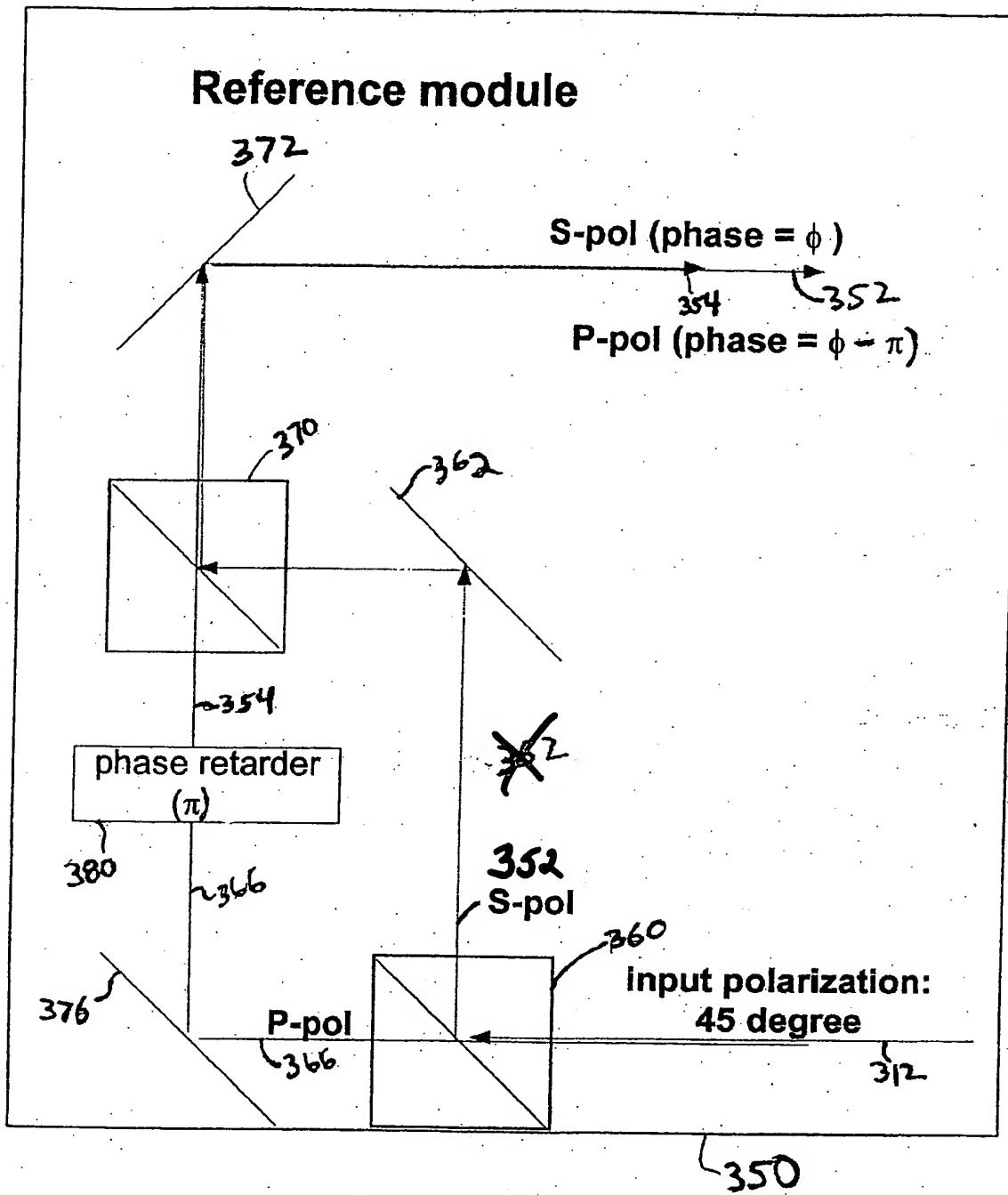


FIG. 3B

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FIG. 6A

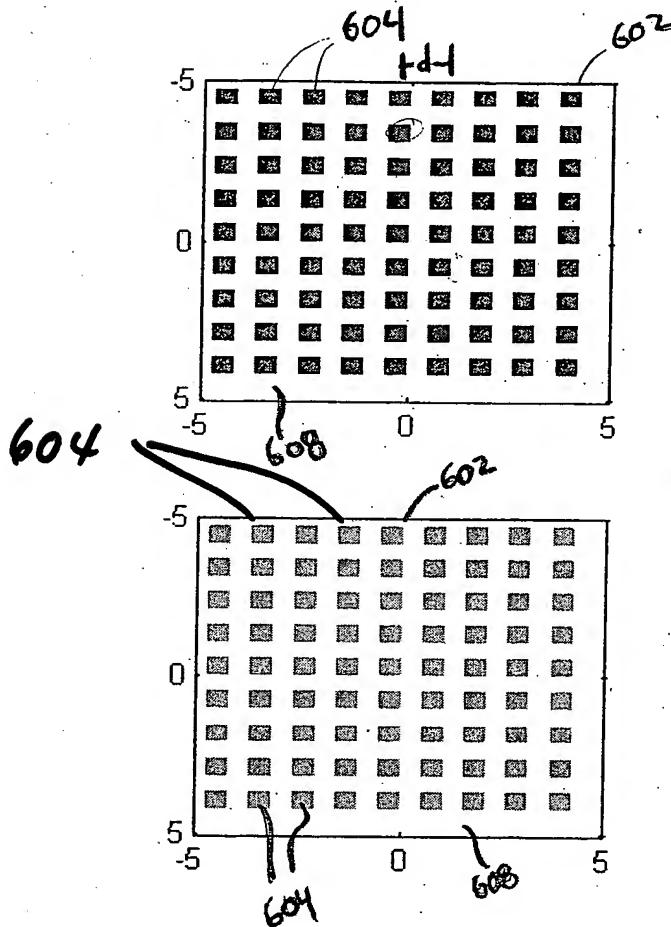


FIG. 6B

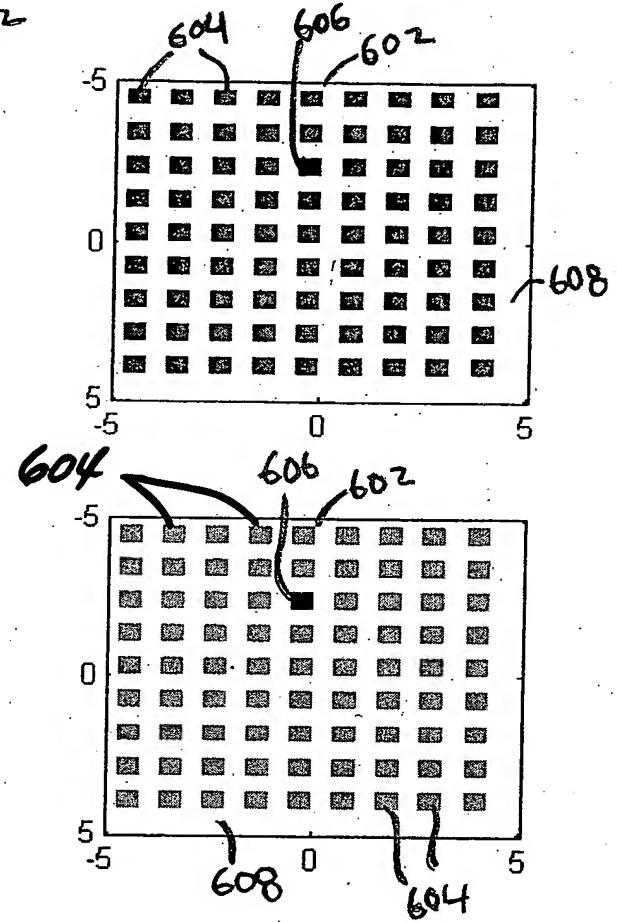


FIG. 6C

FIG 6D

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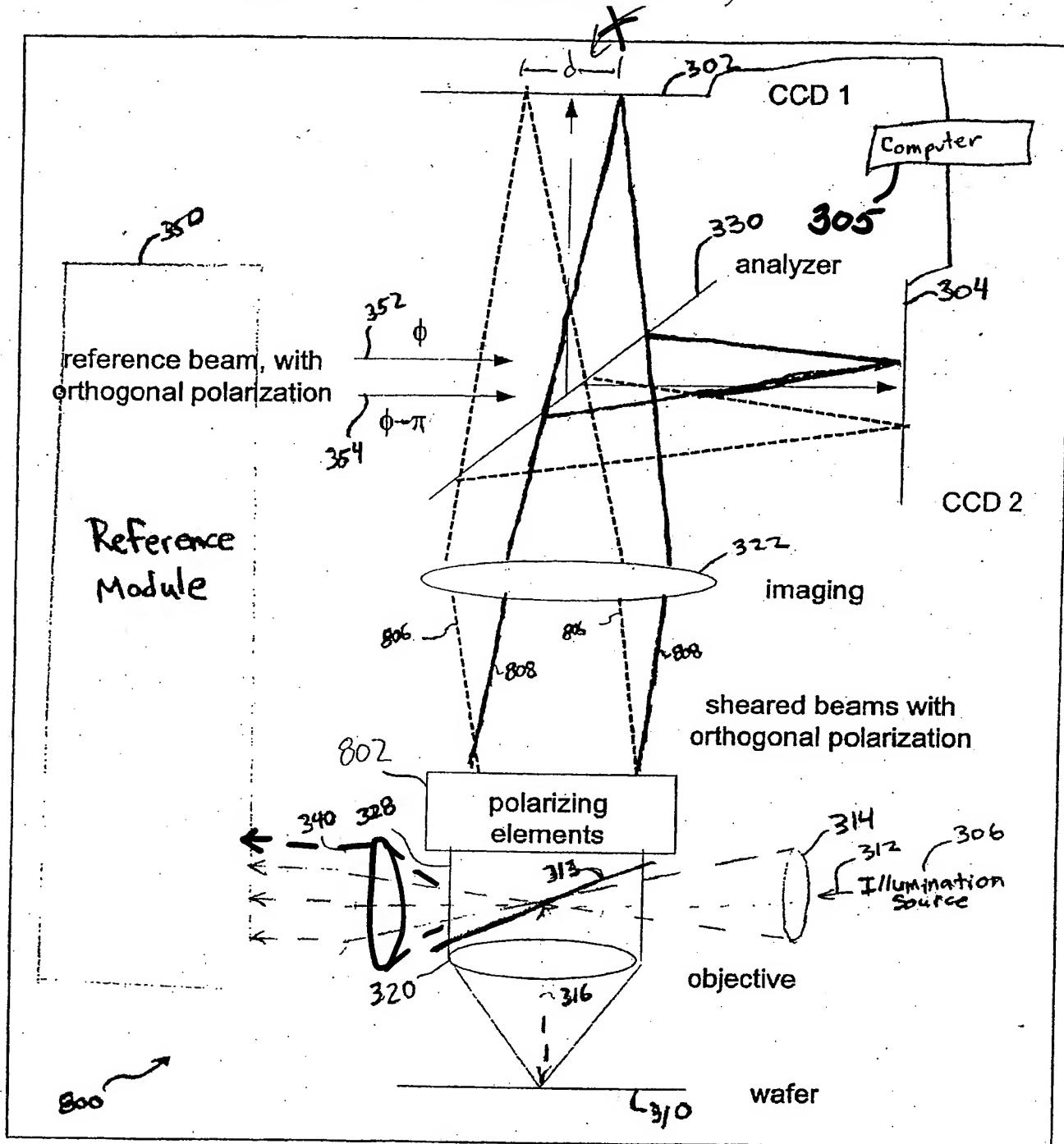


FIG. 8

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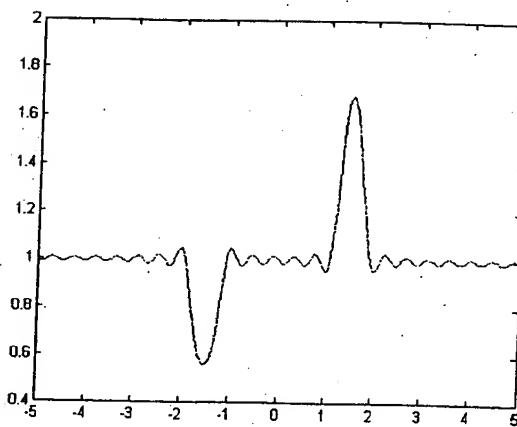


Figure 12C. The simulated signal plot at the CCD through differential interference detection. The object in simulation is illustrated in Figure 7.

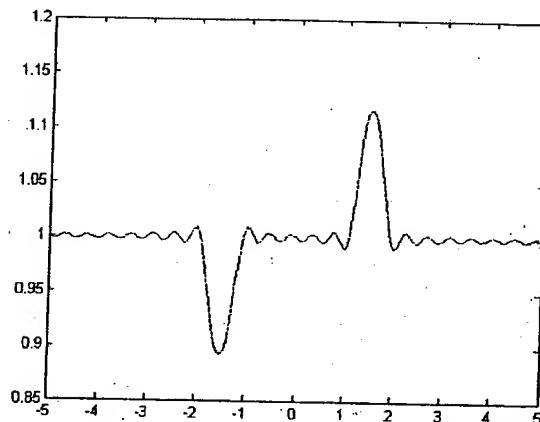


Figure 12D. The simulated signal for the high aspect ratio object with 0.1 amplitude ratio.